

**FINAL SITE INSPECTION REPORT  
FOR  
EMHART ENTERPRISES  
NEW HAVEN, CONNECTICUT**

Prepared For:  
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Office of Site Remediation and Restoration  
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## **DISCLAIMER**

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## **INTRODUCTION**

The Roy F. Weston, Inc. (WESTON®), Superfund Technical Assessment and Response Team (START) was requested by the U.S. Environmental Protection Agency Region I (EPA Region I), Office of Site Remediation and Restoration to perform a Site Inspection (SI) of the Emhart Enterprises property on 446 Blake Street, New Haven, Connecticut. Tasks were conducted in accordance with the SI scope of work and technical specifications provided by EPA Region I. A Final Preliminary Assessment (PA) Report for the Emhart Enterprises property was prepared by CDM Federal Programs Corporation/Alternative Remedial Contracts Strategy (CDM/ARCS) for EPA Region I on 15 September 1995. The PA concluded that an area of soil was contaminated with chlorinated volatile organic compounds (VOCs), specifically 1,1,1-trichloroethane (1,1,1-TCA), as a result of overflow from a 500-gallon solvent storage tank at the time of filling. On the basis of this information, an SI was initiated.

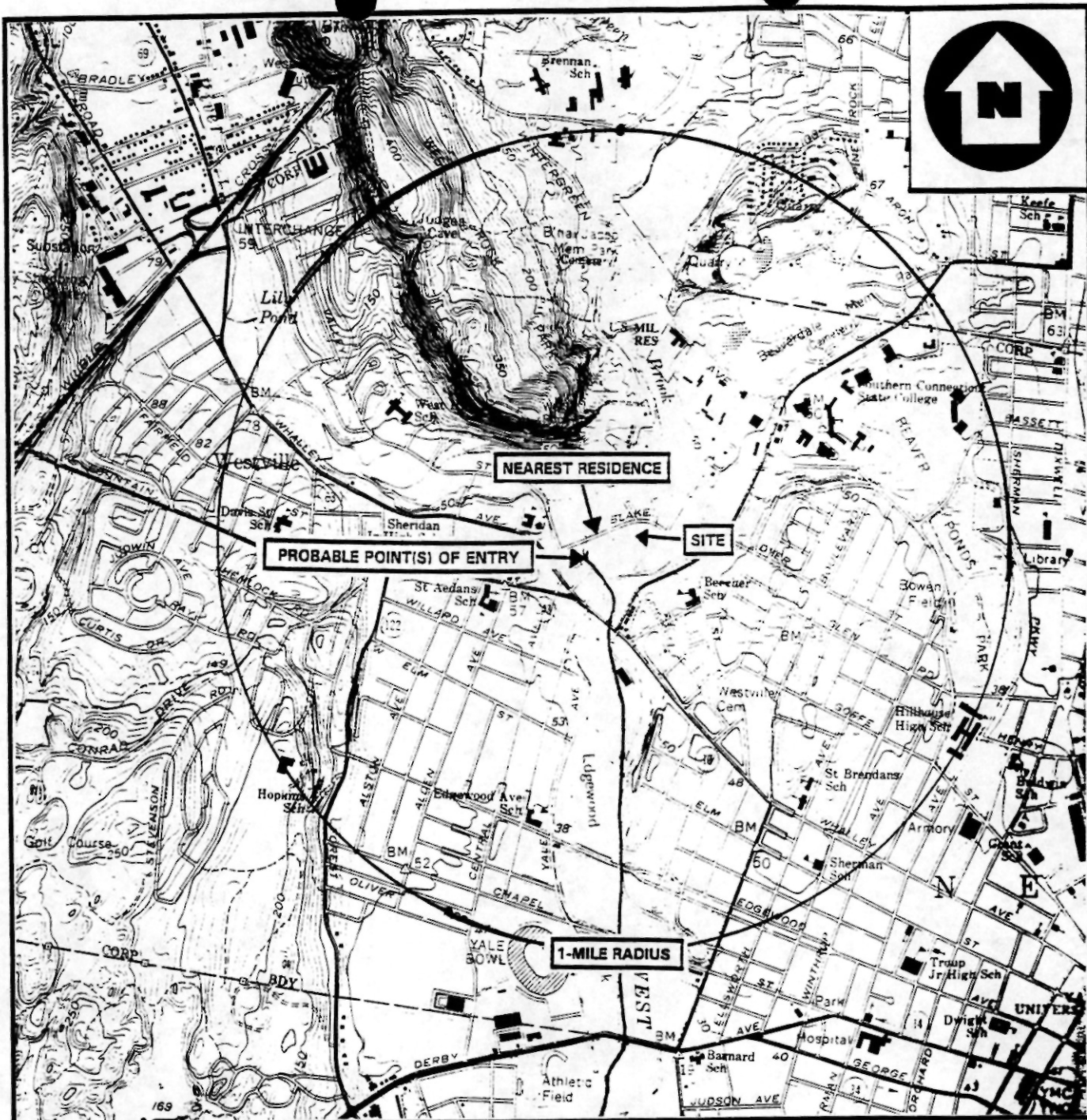
Background information used in the generation of this report was obtained through file searches conducted at EPA Region I, Connecticut Department of Environmental Protection (CT DEP), telephone interviews with town officials, conversations with persons knowledgeable of the Emhart Enterprises property and conversations with other Federal, State, and local agencies.

This package follows the guidelines developed under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, commonly referred to as Superfund. However, these documents do not necessarily fulfill the requirements of other EPA Region I regulations such as those under the Resource Conservation and Recovery Act (RCRA) or other Federal, State, or local regulations. SIs are intended to provide a preliminary screening of sites to facilitate EPA Region I's assignment of site priorities. They are limited efforts and are not intended to supersede more detailed investigations.

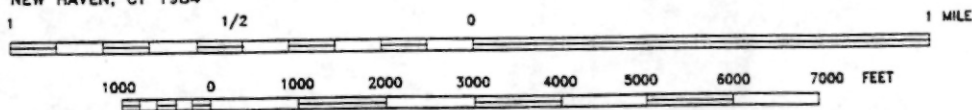
## **SITE DESCRIPTION**

The Emhart Enterprises (Emhart) property is located at 446 Blake Street in the City of New Haven, New Haven County, Connecticut. The geographic coordinates of the property as measured from the southwest corner of the building are 41° 19' 37.6" north latitude and 72° 57' 28.7" west longitude (Figure 1) [2; 13; 14; 15; 16]. Emhart is located in a highly developed urban area with commercial and multi-residential properties surrounding the facility on all sides [1; 7].

The Emhart property consists of an irregularly shaped 10.2-acre parcel of land identified by the City of New Haven Tax Assessor's office on Map No.372, Block No. 1159, Parcel 100. Emhart occupies two properties separated by Wintergreen Brook (Figure 2) [2; 7]. The western property is approximately 8.58 acres, and has been occupied by manufacturing facilities since the 1890s. Starting in 1963, MITE (Miniature Industrial Technological Equipment) Corporation operated at this property [2, p. 1]. The manufacturing building is currently owned by the New Haven Manufacturing Corporation (New Haven Manufacturing) [7]. New Haven Manufacturing currently has four divisions: Amaton, Stromberg, Gar Kenyon, and Piat Incorporated, which manufacture electronic timing devices, hydraulic valves, and electronic assembly hardware components [2; 7].



BASE MAP IS A PORTION OF THE FOLLOWING 7.5' U.S.G.S. QUADRANGLE(S):  
NEW HAVEN, CT 1984



QUADRANGLE LOCATION

SITE LOCATION MAP  
EMHART ENTERPRISES  
446 BLAKE STREET  
NEW HAVEN, CONNECTICUT

**WESTON**  
MANAGERS DESIGNERS/CONSULTANTS®

REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

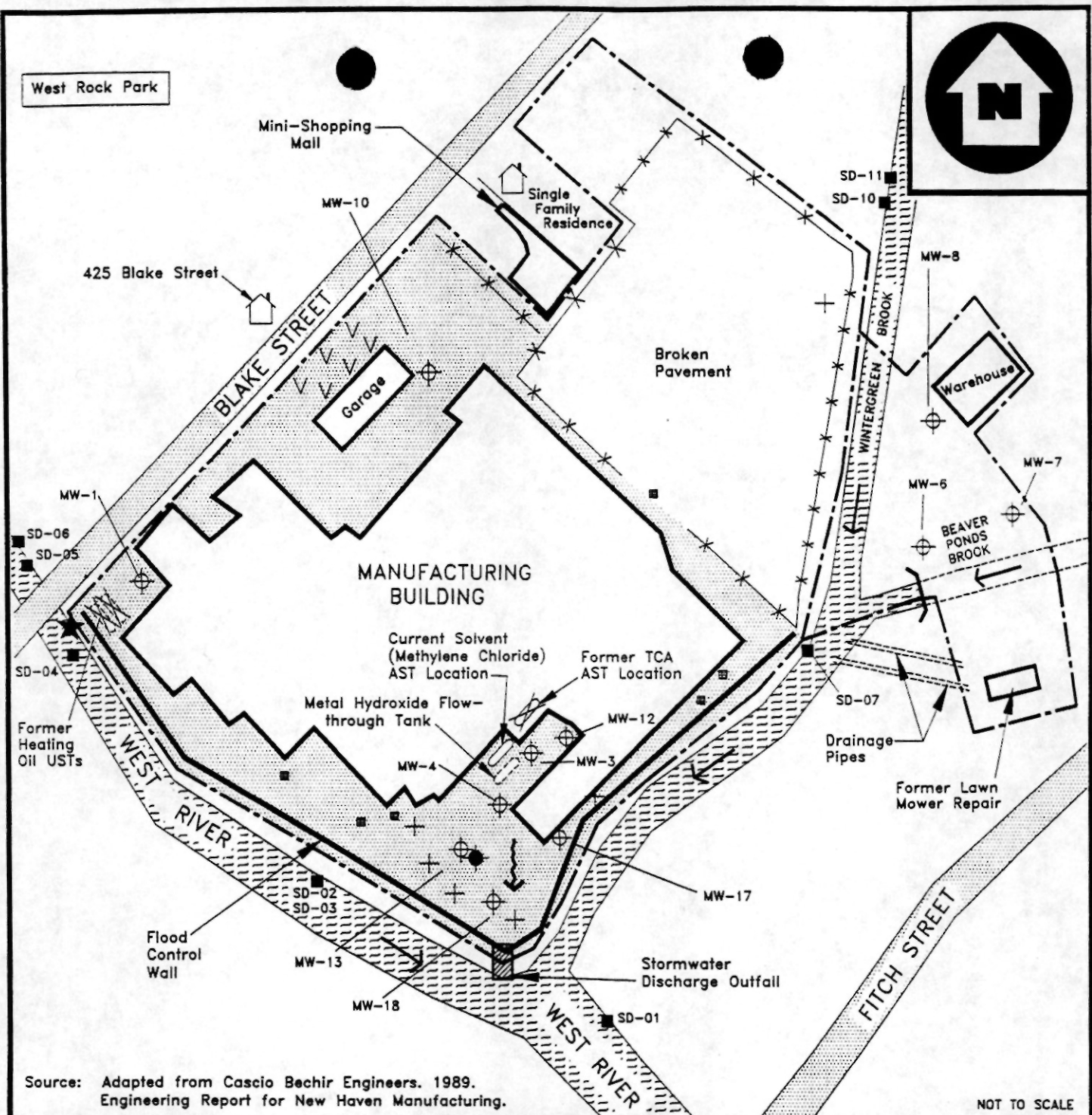
TDD NO.  
98-05-0041

DRAWN BY:  
S. KIRAS

DATE  
19 OCTOBER 1998

FILE NAME:  
S:\97040013\FIG1.DWG

FIGURE 1



Source: Adapted from Cascio Bechir Engineers, 1989.  
Engineering Report for New Haven Manufacturing.

#### LEGEND

■ START SEDIMENT SAMPLE	▨ SURFACE WATER	--- UNDERGROUND STORAGE TANK (UST)	■ CATCHBASIN	(TCA) 1,1,1-TRICHLOROETHANE
● RECOVERY WELL	▨ PAVED AREA	○ ABOVEGROUND STORAGE TANK (AST)	∇ GRASS	--- PROPERTY BOUNDARY
⊕ MONITORING WELL	▨ FORMER AST		★ PPE	--- FENCE
— CULVERT	▨ FORMER UST		+ DESTROYED MONITORING WELL	← SURFACE WATER FLOW DIRECTION
				← GROUNDWATER FLOW DIRECTION

#### SEDIMENT SAMPLE LOCATIONS

EMHART ENTERPRISES  
446 BLAKE STREET  
NEW HAVEN, CONNECTICUT

**WESTON**  
MANAGERS DESIGNERS/CONSULTANTS

REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

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DATE  
19 OCTOBER 1998

FILE NAME:  
S:\97040031\FIG2.DWG

FIGURE 2



The remaining 1.62 acres of property fronting Fitch Street are located on the east side of Wintergreen Brook (Figure 2). Prior to 1987, Emhart owned all of the 1.62 acres of property fronting Fitch Street, which was occupied by two buildings. One of the buildings has been used as a warehouse for storage of cardboard and other solid material. The other building, abutting Fitch Street, was occupied by Goodies, a lawn mower service shop. In 1987, Quincy Technologies purchased the 1.62 acres of property from Emhart; the small section of property occupied by Goodies was not purchased. This Goodies property was sold prior to the initiation of the PA conducted by CDM, and is therefore, for the purposes of this investigation, not considered part of the Emhart property. The Goodies building is now vacant. New Haven Manufacturing has a right-a-way to the west of Goodies building to access its property from Fitch Street [2; p. 3]. Several single and multi-family residences are located on Blake Street directly across from the manufacturing building. Additionally, an old shopping plaza is located adjacent to the manufacturing building [7].

The Emhart manufacturing building covers 35 to 40 percent of the active 8.58-acre parcel, located to the northwest of Wintergreen Brook. The active parcel consists of paved parking areas and a manufacturing facility. The property is flat, sloping slightly towards the West River and Wintergreen Brook [2, p. 3]. The elevation varies between 30 feet above mean sea level (msl) along the northern property boundary down to 20 feet below msl near the confluence of the West River and Wintergreen Brook. Runoff over the property flows from the northern side of the manufacturing facility, around the manufacturing building, into the West River and Wintergreen Brook. As a result of a West River Location Protection Project, completed by the U.S. Army Corps of Engineers (ACOE), the facility is surrounded by a flood control wall protecting the facility from flooding. The flood control wall is a concrete structure located along the southeast border of the property, extending from within the bank of the Wintergreen Brook and the West River, to a height ranging from 3-to-6 feet above the ground surface on the property [2, p.5; 7].

Stormwater runoff from the property is collected in several drains and flows, via underground culverts, across the southern property line towards the West River. Wastewater from the facility's treatment system is discharged to the New Haven public sewer system [2, p. 5].

On 24 November 1997, START conducted an on-site reconnaissance of the Emhart property. The manufacturing building is approximately 118,000 square feet (ft<sup>2</sup>) and is constructed on a concrete slab. The different interior processing areas observed included a plating room, which was bermed and had floor sumps; a polishing area; a waste treatment facility; and a hazardous waste storage area used for storing oils. The hazardous waste storage area included 23 55-gallon drums used for storing oils, and several empty 55-gallon drums used for storing lead. Several pails and industrial-sized containers were observed by START personnel to be located on the concrete floor in the storage area. Drums containing corrosives were labeled and placed on metal grates. Located against the wall in the processing area were 10 oversized drums used for storage of waste materials; this area was also bermed [7].

The facility building is located approximately 40 feet from Wintergreen Brook on the southeast corner of the property and 15 feet from West River on the southwest corner of the property. The inactive parcel of the property (formerly owned by Goodies), located on the east side of Wintergreen Brook, consisted of a vacant lawn mower repair shop. The area where the former lawn mower repair shop was located is littered with debris, cinder blocks, old tarps, and general refuse. Two outfall pipes were observed to originate from behind the former lawn mower repair shop and discharge into Beaver Ponds Brook and Wintergreen Brook. Six catchbasins were observed located along the perimeter of the active parcel of property. Three catchbasins were



observed to be located along the flood control wall on the edge of West River: two near the flood control wall along Wintergreen Brook, and one along the pavement on the northern edge of the manufacturing building. Seven monitoring wells were observed by START personnel on the property that appeared to be in good condition [7].

A 500-gallon solvent aboveground storage tank (AST), currently used by New Haven Manufacturing to store methylene chloride, is located in the alcove in the southern portion of the exterior of the manufacturing building. No staining or evidence of leakage from the tank was observed. Additionally, a 4,500-gallon flow-through underground storage tank (UST) containing metal hydroxide is located in this area. No evidence of a release from the tank was observed by START personnel [7].

On 15 October 1998, START personnel collected nine sediment samples (including duplicates) from six locations along both the West River and Wintergreen Brook (Figure 2). The samples were analyzed for VOCs, semivolatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (Pest/PCBs), and inorganics (total metals and cyanide) by a predesignated Delivery of Analytical Services (DAS) laboratory. Sediment samples SD-05 and SD-06 were collected to establish reference conditions for sediment samples collected from the West River (SD-04, SD-03, SD-02, and SD-01). Sediment samples SD-10 and SD-11 were collected to establish reference conditions for the sediment sample collected along Wintergreen Brook (SD-07). No elevated levels of substances attributable to the historic use of the property were detected during the sampling event. Sediment sampling activities are described in greater detail in the surface water section of this report.

According to the Resource Conservation and Recovery Information System (RCRIS), 190 RCRA-registered small quantity generators (SQGs) are currently located in the City of New Haven. The SQG nearest to Emhart Enterprises is Stop Cleaners (EPA ID No. CTD089627129), located at 284 Blake Street, approximately 0.8 miles to the east of Emhart Enterprises. Emhart Enterprises first notified CT DEP and EPA of its RCRA status on 18 August 1980. Emhart Enterprises has been a large quantity generator (LQG), and a burner/blender facility. Emhart Enterprises changed its burner/blender status in 1988, when the USTs used to store burner oil were removed by New Haven Manufacturing. No facilities listed in the Comprehensive Environmental Response, Compensation, and Liability Information Systems (CERCLIS) database are located within 1-radial mile of Emhart Enterprises [2, p. 12-13].

## **OPERATIONAL AND REGULATORY HISTORY AND WASTE CHARACTERISTICS**

The Emhart property was first occupied in 1890 by Greist Manufacturing. Greist Manufacturing produced electronic devices similar to those currently produced on the property. In 1963, MITE Corporation purchased the property. On 1 May 1985, Emhart Enterprises, Inc., of Townson, Maryland purchased the MITE Corporation and changed its name to MITE-Diversified Products. According to an inspection conducted by the CT DEP Bureau of Hazardous Waste Management in 1983, MITE Corporation manufactured electronic timing clocks. On 12 August 1987, Quincy Technologies, Inc., purchased the facility from Emhart Enterprises, Inc. Quincy Technologies, Inc., maintained the same management, personnel, and manufacturing processes associated with MITE Corporation and MITE-Diversified. On 22 June 1989, a group of 35 Quincy Technologies, Inc. employees purchased the company and renamed operations on the property New Haven Manufacturing Corporation [2, p. 6].

Based on available file information, an area of soil in the southwest corner of the property was contaminated with chlorinated VOCs, specifically TCA, as a result of repeated historical releases from a 500-gallon solvent AST that had occurred during the 1960s. The AST was located over unpaved ground and had no known secondary containment. Reportedly, the tank operator would off-load the full volume of TCA, regardless of the volume of TCA remaining in the storage tank at the time of the filling. The excess TCA would presumably overflow onto the ground. Use of TCA ceased on the property at an unknown date when use of methylene chloride was initiated. The AST remains in use on the property and is used for the storage of methylene chloride; however, the tank is currently located approximately 10 feet southwest of the original tank location and is covered and within a berm structure [2].

On 8 November 1967, the Connecticut Water Resources Commission visited MITE Corporation on a routine inspection. At the time, MITE Corporation employed 680 people. The inspection report indicates that in 1967, wastewaters were being discharged to the municipal sewer. In 1973, the Connecticut Water Resources Commission inspected the facility again. Manufacturing processes during this time included nickel plating, heat treating, barrel tumbling, and manufacturing of sewing machine and typewriter parts [2, p. 6].

In 1976, MITE Corporation sent a letter to the CT DEP Waste Management Bureau which included a form detailing the manufactured items, waste generated per year, and waste disposal practices. Wastes generated by the physical operations (machining and grinding) included unspecified metal chips (427,322 pounds), oil and water (2,500 gallons), grinding sludge (1,500 pounds), and an unknown volume of waste paper and cardboard. Wastes generated per year by heat treating (tempering and brazing) included quench oil (750 gallons), sodium cyanide (500 pounds), and natural salts (1,000 pounds). Wastes generated per year by cleaning product pieces (degreasing and descaling) included mineral spirits (6,000 gallons), mutaric acid (1,500 pounds), TCA (1,000 pounds), cutting compounds (1,500 pounds), burnishing compounds (7,950 pounds), potash (1,600 pounds), cob meal (18,000 pounds), and diluted salts (1,100 pounds). Wastes generated per year by finishing processes (painting, coating, and printing) included paint thinner (200 gallons) and paint waste (780 pounds). According to MITE Corporation personnel, all wastes on the property were stored in barrels and removed by J. Regan, NuStone Industrial and/or F. Perrotti & Sons [2, p. 7]. Information concerning the location of the waste storage areas or frequency of waste disposal was not included in the letter.

In June 1982 (prior to the construction of a flood control wall), CT DEP responded to reports concerning 55-gallon drums floating in the West River and washing up along the banks of the West River after a storm and subsequent flooding. These drums were swept downstream from several upstream industries. A total of 59 drums were located by CT DEP personnel. MITE Corporation estimated losing 50 to 60 drums during the storm. On 19 July 1982, East Coast Environmental removed several drums that were swept away during the storm and was planning to wait for the marsh along the river banks to dry up before removing the remaining drums [2, p. 7]. Indication of the condition of the drums released to the river could not be located in available file information; however, the majority of the drums were observed by East Coast Environmental to be at least partially full during removal from the river. A release of hazardous substances to the river likely occurred. A concrete flood prevention wall was constructed by ACOE on the property in 1990 to limit the potential for flood damage [2].

On 6 December 1983, the CT DEP Hazardous Waste Management Section (HWM) of the Hazardous Materials Management Unit visited the MITE Corporation as part of a routine compliance inspection. The inspection debriefing memorandum indicated that the facility was possibly an SQG but had over 1,000 kilograms (kg) of hazardous waste material on the property at the time of the inspection. The debriefing memorandum also stated that the facility did not maintain records of the TCA, cyanide waste, mineral spirits, and quench oil used/ or generated on the property. Also, manifests were not available for wastes allegedly removed from the facility, and the memorandum stated that NuStone Industrial was not a permitted waste hauler. The inspector noted that the waste oil storage area was sloppy and that the oil was leaking onto the pavement and into the West River [2, p.7].

On 12 April 1984, a CT DEP interdepartment message indicated that CT DEP issued MITE Corporation Order No. HM-150 as a result of deficiencies noted during the 6 December 1983 inspection. The Order required MITE Corporation to remove all wastes observed during the inspection, retain a qualified consultant, and prepare a report detailing removal actions and future waste handling practices [2, p. 8].

On 31 August 1984, MITE Corporation completed the Hazardous Waste Report entitled "Hazardous Waste Compliance and Management Program". The report indicated that MITE Corporation had established waste management practices in compliance with CT DEP requirements including storing hazardous wastes in contained areas [2, p.8].

On 26 November 1985, the CT DEP HWM visited the MITE Corporation property as part of a routine compliance inspection. The debriefing memorandum indicated that the facility was in full compliance with all CT DEP HWM guidelines with the following exceptions: one drum was stored for over 90 days (contents of the drum was not specified in the memorandum), and an undisclosed number of drums containing mineral spirits designated for burning in the boiler were not labeled. The debriefing memorandum also stated that no materials were being stored outside and that a UST was used to store metal hydroxide sludge (4,500 gallon capacity). In 1985, 300 people were employed on the property by MITE Corporation [2, p. 8].

On 5 February 1986, MITE Corporation submitted Hazardous Waste Generator Report for 1985 to CT DEP which included waste manifests for that year. According to the report, two shipments of waste metal hydroxide were removed by two RCRA transporter companies, Treatment Corporation and Envirite Corporation. A shipment of waste paints, naphtha products, and other liquids was removed by Gold Shield Solvents for reclamation. A follow-up inspection on 25 March 1986 by CT DEP indicated that MITE Corporation had corrected all deficiencies noted during the November 1985 compliance inspection [2, p. 9].

On 11 June 1987, the CT DEP visited the MITE Corporation property for a routine compliance inspection. The debriefing memorandum indicated that the facility was in full compliance with all CT DEP HWM guidelines. Manufacturing processes were noted during the inspection to be similar to those historically conducted on the property. TCA was noted as being used as a degreasing agent; MITE Corporation reported that eight drums of waste TCA were generated annually. In 1987, MITE Corporation employed 242 people on the property [2, p. 9].

On 12 August 1987, MITE-Diversified Products was purchased by Quincy Technologies, Inc. Management. There were no significant changes to the manufacturing process as a result of the new ownership. Quincy Technologies, Inc., agreed to purchase the second property east of Wintergreen Brook if cleanup standards were met. According to a report completed by Groundwater Technology, Inc., for Emhart Corporation (parent company for Emhart Enterprises), Goodies (lawn mower repair shop) used an on-site dry well on the second property to dispose of waste oil and grease [2, p. 9]. The location of the on-site dry well could not be determined from available file information.

Table 1 summarizes identified structures or areas on the Emhart Enterprises property that are documented or potential sources of contamination.

**Table 1**  
**Source Evaluation for Emhart Enterprises**

Source Area	Containment Factors	Spatial Location
Methylene Chloride AST	The tank is bermed and covered.	The southwestern portion of the property.
Former TCA AST	The tank has been removed from the property; however, soil contamination remains on the property.	The southwestern portion of the property.
Contaminated Soil	Partially located under a concrete building expansion.	The southwestern portion of the property.
Metal Hydroxide Tank	The tank is contained within concrete walls.	The southwestern portion of the property.
Drums Released to the West River	All known drums have been removed from the river.	Floating in the West River, downstream of the property.
Former Waste Oil Storage Area	The source has been removed from the property.	Unknown
Hazardous Waste Drum Storage Areas.	The drums are located on a concrete floor and the area is covered.	Located within the building.
Former No. 2 and No. 4 Fuel Oil USTs	Removed from property in Nov. 1988.	Southwestern portion of the property.
Former Mineral Spirit UST	Cleaned and filled with concrete in 1986.	Unknown

AST = Aboveground storage tank  
TCA = 1,1,1-Trichloroethane  
UST = Underground storage tank

Table 2 summarizes the types of potentially hazardous substances which have been disposed, used, or stored on the Emhart Enterprises property.

**Table 2****Hazardous Waste Quantity for  
Emhart Enterprises**

Substance	Quantity or Volume/Area	Years of Use/Storage	Years of Disposal	Source Area
1,1,1-Trichloroethane	1,000 ft <sup>2</sup>	Unknown	Unknown	Contaminated Soil
No. 2 and No. 4 Fuel Oil	10,000 gallons	Unknown	Unknown	Tanks
Mineral Spirits	2,000 gallons	Unknown	Unknown	Tank
Metal Hydroxide	4,500 gallons	Unknown	Unknown	Tank
Waste Oil	1 ft <sup>3</sup>	Unknown	Unknown	Contaminated Soil

According to RCRIS, there are currently 190 RCRA-registered SQGs located in the City of New Haven. The SQG nearest to Emhart is Stop Cleaners (EPA ID No. CTD089627129), located at 284 Blake Street, approximately 0.8 miles to the east of Emhart. Emhart first notified CT DEP and EPA of its RCRA status on 18 August 1980. Emhart Enterprises has been an LQG, and a burner/blender facility. Emhart changed its burner/blender status in 1988, when the USTs were removed. No facilities listed in the CERCLIS database are located within 1-radial mile of Emhart [2, p.12-13].

**WASTE/SOURCE SAMPLING**

On 2 November 1988, New Haven Manufacturing removed two USTs used to store burner oil. The USTs are described as located on the southwestern exterior of the manufacturing building, approximately 62 ft from Blake Street. Oils used on site included No. 2 and No. 4 oil. New Haven Manufacturing currently uses natural gas piped from a main on Blake Street [2, p. 9].

In 1989, Black & Decker Corporation purchased Emhart Corporation, becoming "successors-in-interest" to Emhart, "assuming obligations and liabilities of Emhart Enterprises relating to the" manufacturing facility. In May 1989, under contract to Emhart Corporation, Groundwater Technology, Inc., supervised the removal of 130 gallons of waste oil/water from the dry well located at the former lawn mower repair facility and the excavation of approximately 350 tons of contaminated soil from around the dry well. The contaminated soil was disposed of in the Derby Landfill (EPA ID No. CTD982545618). Composite confirmation samples collected from the walls and bottom of the excavation were analyzed for purgeable halocarbons via EPA Methods 5030/8010 and 5030/8020. Toluene was detected in one sample at 0.20 milligrams per kilograms (mg/kg). A small section of the contaminated soil was not removed due to physical obstacles including the proximity of the contaminated soil to the lawn mower repair shop, a large tree, and overhead power lines [2, p. 9]. The area of the exact location of the former dry well and the excavated soil could not be located in available file information. Based on the conclusions of the PA, this area is not

considered part of the Emhart property. Potential source areas and residual contamination on the lawn mower repair property will not be evaluated during this investigation due to different ownership from the primary area of concern on the manufacturing area [2].

In 1989, under contract to New Haven Manufacturing, Cascio Bechir Engineers (Cascio) completed a report entitled "Summarizing the Site Investigations". Cascio was asked to determine if contamination resulting from processes at the site was migrating from the facility. Cascio investigated the manufacturing areas within the building and made recommendations for mitigating the potential to release to the environment from these areas. Cascio also completed a subsurface exploratory program to investigate the possibility of environmental contamination to the site as a result of the historic use of the site as a manufacturing facility. Cascio completed 11 borings (B-1, and MW-2 through MW-11) and completed monitoring well installation in boring locations MW-3 through MW-11. Soil and water samples were collected and analyzed for hydrocarbon and heavy metal contaminants. Results indicated the presence of groundwater contamination in four of the nine wells installed by Cascio on site. Cascio submitted soil samples collected from the borings for VOCs and metals analyses. Three soil samples were collected from each boring (at 5-foot intervals). The samples were composited into one sample and analyzed by Environmental Consulting Laboratories, Inc. for Extraction Procedure (EP) Toxicity metals and for VOCs. No metals or aromatic VOCs were detected. Chlorinated VOCs, including 1,1-dichloroethane (1,1-DCA) [1.6 parts per billion (ppb)] and TCA (918.8 ppb), were detected according to the Environmental Setting section of the report. Cascio recommended the installation of additional monitoring wells in the vicinity of MW-3, located near the former TCA tank location [2, p. 10]. Groundwater and soil sampling conducted on the property is discussed in greater detail in the appropriate sections of this report.

In March 1990, Cascio installed two additional monitoring wells, MW-12 and MW-13, near monitoring wells MW-3 and MW-4. These wells were installed as close as possible to the former location of the solvent tank, which was the suspected source of the contamination. These wells were installed during a second round of sampling conducted by Cascio personnel in 1990. The results were incorporated in the Addendum to the Supplemental Report. Cascio collected discrete interval [0 to 2, 5 to 7, 10 to 12, and 15 to 17 feet below ground surface (bgs)] soil samples from MW-12 and MW-13. The soil samples collected from MW-13 were composited, after field screening with unspecified air monitoring equipment determined that the samples were relatively free of contamination. The composite sample from MW-13 and the interval samples from MW-12 were sent to Environmental Consulting Laboratories, Inc. for VOC analysis via EPA Method 8010. TCA [7.6 micrograms per kilogram ( $\mu\text{g}/\text{kg}$ )] was detected in the MW-13 composite sample. TCA (6.6  $\mu\text{g}/\text{kg}$ ) and trichloroethylene (TCE) (2.3  $\mu\text{g}/\text{kg}$ ) were detected in the 0- to 2-foot interval sample of MW-12. The highest concentrations of VOCs were detected in the 10- to 12-foot interval of MW-12: 1,1-DCA (16.9  $\mu\text{g}/\text{kg}$ ); 1,1-dichloroethylene (1,1-DCE) (4.7  $\mu\text{g}/\text{kg}$ ); trans-1,2-dichloroethylene (t-1,2-DCE) (10.0  $\mu\text{g}/\text{kg}$ ); methylene chloride (7.6  $\mu\text{g}/\text{kg}$ ); tetrachloroethylene (PCE) (3.4  $\mu\text{g}/\text{kg}$ ); TCA (224.4  $\mu\text{g}/\text{kg}$ ); and TCE (7.2  $\mu\text{g}/\text{kg}$ ) [2, pp. 10-11].

In May 1990, Cascio completed the Site Contamination Evaluation report summarizing findings of its investigations of the manufacturing activities and soil and groundwater samples collected during the past sampling events. Cascio installed three additional monitoring wells, MW-14 through MW-

16. Monitoring wells MW-14 and MW-16 were installed approximately 15 feet east of the existing chain-link fence; this represents the outer edge of excavation proposed for the area in the ACOE West River Flood Control Project. Connecticut Test Borings of Seymour, Connecticut installed all groundwater monitoring wells at the property. Soil samples were collected by Cascio personnel at the same intervals as from the MW-12 boring. The samples were screened using an HNU 101 photoionization detector with a 10.2 electrovolt (eV) probe. Cascio reported that no evidence of soil contamination was detected in the field. Cascio collected groundwater samples from monitoring wells MW-3, MW-4, MW-10, MW-11, MW-12, MW-13, MW-14, MW-15, and MW-16. Contaminants detected in groundwater samples collected in May 1990 were similar to those detected in previous sampling rounds [2, p. 11]. Groundwater sampling conducted on the property is discussed in greater detail in the groundwater section of this report.

In February 1992, The Stephen B. Church Company, under contract to the New Haven Manufacturing Corporation, installed a production well system in the area of MW-3 in order to tap into the area suspected of containing high concentrations of TCA and to pump the contaminated water directly to the recovery well and air stripper. The production well system consists of a 6-inch recovery well, which pumped the contaminated groundwater in the air stripper. This system was intended to shorten the period of time needed to reduce the TCA level on site to below the suggested no adverse reaction level (SNARL) of 200 ppb. The recovery well was installed to 18.8 feet bgs. The drilling soils were sampled by Cascio personnel and analyzed for VOCs by Baron Consulting Company via EPA Method 8010. Analytical results indicated the presence of TCA (maximum concentration of 160 ppb) and 1,1-DCE (18 ppb). The recovery well is connected to a recovery trench. The treated water from the production well and air stripper was piped into the industrial waste pump station, which is connected to the City of New Haven Sewage Treatment Facility, a publicly-owned treatment works (POTW) [2, p. 11].

On 21 July 1992, the CT DEP Bureau of Water Management signed the discharge permit for New Haven Manufacturing Corporation that was submitted first in 1990 and revised as final on 14 April 1992. The permit allowed for the discharge of average daily flows of 38,000 gallons per day (gpd) of combined discharge, including 11,500 gpd of trumbling and cleaning wastewater and 26,500 gpd of metal finishing wastewater to the City of New Haven Sewage Treatment Facility. The trumbling and cleaning of parts wastewater discharge was monitored weekly for cadmium, total and hexavalent chromium, copper, lead, nickel, zinc, oil and grease, total toxic organics, and pH. Discharge sampling results could not be located in available file information. The permit expired 21 July 1997 [2, p. 12].

In October 1993, Cascio submitted a Groundwater Reclassification Request for New Haven Manufacturing to CT DEP. CT DEP had classified groundwater for the entire property as GA; however, all properties surrounding this facility are classified as GB. The request was filed because a reclassification would result in eliminating the need to remediate the groundwater, as class GB waters do not have as strict water quality requirements. CT DEP established the area as GA because the groundwater is located at the confluence of several surface water bodies and therefore requires additional protection. In the request, Cascio argued that this facility has been used for industrial activities for over 100 years, as have a majority of the surrounding properties. For this reason, Cascio and New Haven Manufacturing believed that the area should be classified as GB [2, p. 12].



In March 1995, the groundwater treatment system was shut off because CT DEP wanted to know the groundwater quality in non-pumping conditions. The shut off was scheduled for 1 year with the intention of documenting seasonal fluctuations and groundwater quality during non-pumping conditions. A groundwater sample collected from MW-12 in April 1995 contained TCA at a concentration of 800 µg/L [2, p. 12].

In June 1995, two additional groundwater monitoring wells (MW-17 and MW-18) were installed by Cascio contractors in the southwest corner of the facility. Two soil samples were collected by Cascio personnel from the soil borings and analyzed for VOCs; no VOCs were detected. A groundwater sample was collected by Cascio personnel from each well. TCA was detected in both groundwater samples collected. Additionally, Marine Environmental, Inc., under contract to Cascio, installed five temporary vapor probes in the boiler room (immediately north and east of the former TCA storage tank). Vapor samples were analyzed with a Photovac portable gas chromatograph. TCE, PCE, and TCA were detected. The highest concentrations were detected in VP-5: TCE (2.6 ppm), PCE (0.352 ppm), and TCA (71.642 ppm) [2, p. 12].

Cascio has been collecting groundwater samples from monitoring wells MW-3 and MW-12 on a quarterly schedule. Concentrations of TCA continue to exceed the 200 µg/L State of Connecticut SNARL and EPA maximum contaminant level (MCL) [2, p.12].

Table 3 provides a summary of compounds and elements detected through analyses of surface soil samples collected on 8 March 1990 by Connecticut Test Borings from the Emhart Enterprises property.

**Table 3**

**Summary of Highest Concentrations of Substances Detected in Surface Soil Samples for the Emhart Enterprises Property**

Sample Location	Compound/Element	Sample Concentration	Reference Concentration	Comments
MW-12 (0'-2')	1,1,1-Trichloroethane	6.6 µg/kg	--	--
MW-12 (0'-2')	Trichloroethylene	2.3 µg/kg	--	--

No known reference samples were collected during the sampling event.

µg/kg = micrograms per kilogram.  
' = feet.

[3, p. 17]

## GROUNDWATER PATHWAY

Surficial materials at the property consist of artificial fill [1]. The fill overlies sand and gravel deposits, which are found throughout much of the city and which were created as streams of meltwater flowed southward from the receding glacier. The valley deposit is composed of both ice-contact stratified drift and outwash sediments; the outwash sediments are prevalent in the area surrounding the property, and extend southward through the river valley to the harbor. A thin band of alluvial deposits is found along the banks of the West River in several locations south of the property [1]. Connecticut Test Borings, Inc., of Seymour, Connecticut, completed soil borings for Emhart Enterprises. Soil sampling logs for borings completed in 1989 indicate that the top 4 feet consists primarily of red-brown fine- to coarse-grained sand with silt and some fine- to coarse-grained gravel [2].

The Bedrock Geology Map of Connecticut shows that the bedrock beneath the property is mapped as New Haven Arkose [3]. New Haven Arkose is a red-to-brown, medium- to coarse-grained sandstone-like, sedimentary rock. The depth to bedrock is estimated to be approximately 150 feet in the vicinity of the property. Bedrock slopes to the south, with a buried valley located east of the West River [3].

The depth to groundwater in the area of the contaminated soil and contaminated groundwater is 6 feet bgs. The groundwater flows primarily south and southwest from the area of contaminated soil, discharging into the West River and Wintergreen Brook approximately 160 feet from the TCA storage tank. None of the groundwater wells installed at New Haven Manufacturing Corporation encountered bedrock [2, p. 14].

Groundwater west of the property was historically classified as GB/GA [1]. Groundwater with a classification of GA is assumed suitable for human consumption, whereas groundwater with a classification of GB is considered unsuitable for human consumption [1]. The GB classification is used for areas of heavy industrial activity where groundwater is assumed to be contaminated [1]. On 10 October 1996, the CT DEP decided that New Haven Manufacturing met the criteria for lowering the water quality classification from GA to GB [4].

According to the South Central Connecticut Regional Water Authority and the map of public water supplies in the State of Connecticut, there are no public drinking water supply wells located within 4-radial miles of the Emhart property [1; 5]. The water supply for the majority of the 185,000 people living within 4-radial miles of the property is Lake Gaillard, the primary drinking water supply for the entire City of New Haven. Lake Gaillard is located approximately 9 miles east of the Emhart Enterprises property and is not part of the surface water pathway [1; 5; 6].

Private groundwater supplies within 4-radial miles of the property were estimated using equal distributions calculations of the U.S. Census CENTRACTS. CENTRACTS data identify population, households, and private water wells for "Block Groups" which lie within or partially within individual radial distance rings of the Emhart property. Table 4 summarizes estimated drinking water populations served by groundwater sources within 4-radial miles of the property [7; 13; 14; 15].

**Table 4****Estimated Drinking Water Populations Served by Groundwater Sources  
Within 4-Radial Miles of Emhart Enterprises**

Radial Distance from Emhart Enterprises (miles)	Estimated Population Served by Private Wells	Estimated Population Served by Public Wells	Total Estimated Population Served by Groundwater Sources Within the Ring
0.00 < 0.25	0	0	0
0.25 < 0.50	2	0	2
0.50 < 1.00	17	0	17
1.00 < 2.00	475	0	475
2.00 < 3.00	2,208	0	2,208
3.00 < 4.00	2,579	0	2,579
TOTAL	5,281	0	5,281

[7; 13; 14; 15]

Cascio personnel collected groundwater samples from on-site monitoring wells at all stages of its environmental investigations. Cascio collected the first round of samples from four of the newly installed monitoring wells (MW-3, MW-4, MW-10, and MW-11) on 8 November 1989. Chlorinated VOCs were detected in groundwater samples collected from all four wells. The following concentrations were present: 1,1-DCA (68.8 to 193.4  $\mu\text{g/L}$ ); 1,1-DCE (5.1 to 13.9  $\mu\text{g/L}$ ); TCA (157.4 to 1,118  $\mu\text{g/L}$ ); and PCE (1.0 to 2.8  $\mu\text{g/L}$ ). No metals were detected [2, p. 15]. Sampling was conducted throughout this sampling event using the same bailer, which was decontaminated with a clean water rinse only [2, p. 17]

On 16 January 1990, Cascio personnel collected a second round of samples from the same four monitoring wells as sampled in November 1989. Dedicated bailers were used during the collection of groundwater samples. VOCs were present at concentrations similar to those detected in the 1989 samples in monitoring wells MW-3, MW-4, and MW-11. No VOCs were detected in the sample collected from MW-10. Cascio stated that there was a strong possibility that the contamination detected in MW-10 on 8 November 1989 was a result of cross-contamination [2, p. 17].

At Cascio's recommendation, Connecticut Test Borings installed two additional wells (MW-12 and MW-13) on 8 March 1990. Cascio collected groundwater sampled from these wells on 16 March 1990. The samples were analyzed for VOCs via EPA Method 8010. The concentrations of TCA detected in the samples from MW-12, the monitoring well installed nearest to the former location of the solvent storage tank, were significantly higher than those detected in other groundwater samples collected on site (1,875  $\mu\text{g/L}$ ) [2, p. 17].

On 2 May 1990, Connecticut Test Borings installed a third round of groundwater monitoring wells (MW-14, MW-15, and MW-16). These wells were installed at the request of CT DEP along the property's boundary in the vicinity of the West River. These wells were installed in an attempt to ascertain the ultimate fate of the contaminant plume established during the prior sampling events. Cascio personnel collected groundwater samples from MW-3, MW-4, MW-10, MW-11, MW-12, MW-13, MW-14, MW-15, and MW-16 on 9 May 1990. The samples were analyzed for VOCs via EPA Method 8010. Additionally, Cascio recorded groundwater elevations in all on-site wells. Cascio established groundwater contours from these groundwater elevation readings. It was determined that on-site groundwater flows towards the confluence of Wintergreen Brook and the West River. According to the data collected during the sampling event, the groundwater contaminant plume is following the groundwater flow. No VOCs were detected in MW-13, located southeast of the former TCA storage tank [2, p. 17].

In October 1990, the ACOE received the notice to proceed with the construction of the 5-foot-high flood control wall around the western and southern perimeter of the facility. The construction continued through February 1993. This construction resulted in the destruction of several groundwater monitoring wells (MW-5, MW-11, MW-14, MW-15, and MW-16) [2].

A remedial system consisting of an intercepting trench was installed by Cascio personnel and contractors in 1990. The trench was augmented in February 1992, with the installation of a recovery well to increase the rate of remediation. The system discharged to the City of New Haven sanitary sewer system after the effluent passed through an air stripping unit. The system was operated through December 1994, and monthly samples were collected by Cascio personnel from monitoring wells MW-3 and MW-12 [1].

In March 1995, the groundwater treatment system was shut off because CT DEP wanted to know the quality of the groundwater in non-pumping conditions. The shut off was scheduled for 1 year with the intention of documenting seasonal fluctuations. A groundwater sample collected by Cascio from MW-12 in April 1995 contained TCA at 800  $\mu\text{g/L}$ . The concentration in the sample collected in April 1995 was lower than in the sample collected from MW-12 in March 1990 (1,875  $\mu\text{g/L}$ ) [2, p. 12].

In June 1995, monitoring wells MW-17 and MW-18 were installed by Cascio and Cascio contractors. The additional wells were installed on the downgradient side of the recovery trench to determine what effect the groundwater recovery system has on the groundwater quality and what effect the construction of the flood control wall has on the water table. Samples were collected from each of the new wells and analyzed for VOCs via EPA Method 8010 (1.0  $\mu\text{g/L}$  detection limit). TCA was detected in MW-17 at 3.3  $\mu\text{g/L}$  and in MW-18 at 6.5  $\mu\text{g/L}$  [2, p. 12].

Table 5 provides a summary of the highest concentration of substances detected in groundwater samples collected during the most recent sampling event from the Emhart Enterprises Property. Sampling on the property has indicated a decrease in the levels of contamination over time. Past sample results have not been summarized because they no longer accurately represent groundwater quality on the property.

**Table 5**

**Summary of Highest Concentrations of Substances Detected in Groundwater Samples for Emhart Enterprises (6 January 1996)**

Sample Location	Sample Date	Compound/Element	Sample Concentration	Background Concentration	Comments
MW-12	Jan. 1996	1,1-Dichloroethane	57.0 µg/L	DL (1.0)	57.0 × DL
MW-12	Jan. 1996	1,1-Dichloroethylene	2.7 µg/L	DL (1.0)	2.7 × DL
MW-12	Jan. 1996	Tetrachloroethane	170.0 µg/L	DL (1.0)	170.0 × DL
MW-12	Jan. 1996	1,1,2-Trichloroethane	1.8 µg/L	DL (1.0)	1.8 × DL

DL = Detection Limit  
 µg/L = Micrograms per liter.  
 Jan. = January.  
 [19]

A recent sampling round conducted by Cascio, on 10 January 1996, detected 1,1 DCA (1.5 µg/L in MW-3 and 57 µg/L in MW-12); 1,1-DCE (2.7 µg/L in MW-12); tetrachloroethane (6.8 µg/L in MW-3 and 170 µg/L in MW-12); and 1,1,2-trichloroethane (1.8 µg/L in MW-12) [1, Appendix D]. No reference sample was collected during the sampling event.

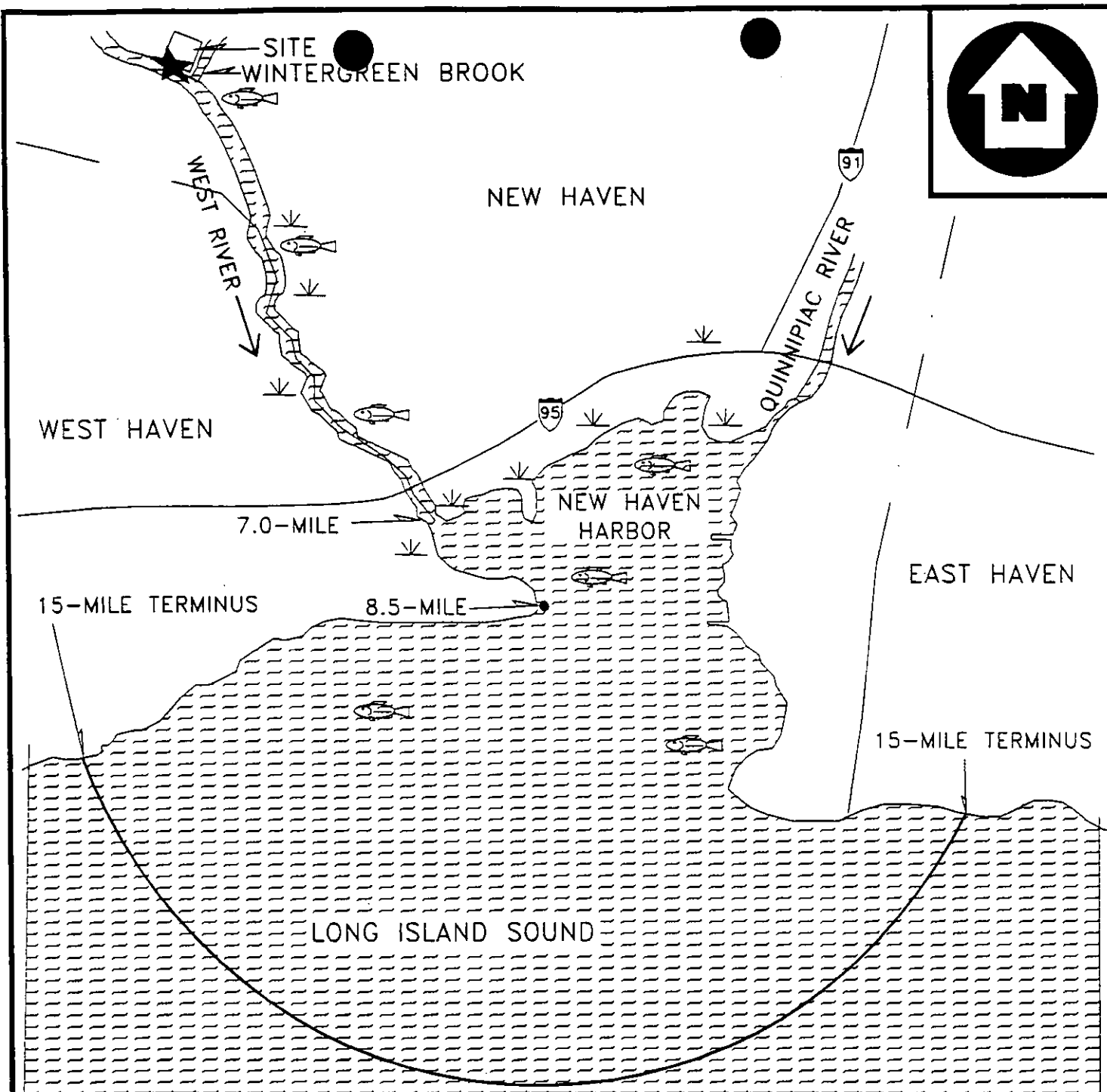
START did not perform groundwater sampling as part of the Emhart SI. Based on analytical results from previous monitoring well sampling events conducted between 1989 and 1996 on the Emhart property and the surrounding area, groundwater beneath the property has been impacted by a release of hazardous substances which appears to be attributable to on-site sources. However, based on the location and limited number of the surrounding residential wells, no nearby drinking water supplies are known or suspected to have been impacted by the release from on-site sources.

## **SURFACE WATER PATHWAY**

The Emhart property is completely covered by the manufacturing building and paved parking areas [7]. The property across Wintergreen Brook is partially covered with broken pavement [7]. Runoff over the property flows from the northern side of the facility, around the building, into the West River and Wintergreen Brook. The flood control project completed by ACOE channels most of the runoff from the property into one discharge point, at the confluence of the two surface water bodies. The most upstream probable point of entry (PPE) of overland runoff from the property is the point at which runoff from the northwestern corner of the property enters the West River. Prior to the construction of the flood control wall, several culverts discharged stormwater to Wintergreen Brook and West River. The culverts no longer exist. The flood control measures on both sides of the brook have made the property inaccessible to the public for recreation or fishing in the immediate area of the manufacturing facility. Additionally, the south side of the Emhart property is lined by a chain-link fence and barbed wire [2, p 3-5; 7].

Groundwater to surface water migration is also possible. The plume of contaminated groundwater in the southwestern corner of the property possibly enters the West River near the southwestern corner of the manufacturing building. The concrete wall constructed by ACOE extends along the entire shared boundary between the Emhart Enterprises property and the two bordering water bodies [2; 7]. Groundwater samples collected from two groundwater monitoring wells (MW-17 and MW-18) on the downgradient side of the recovery trench indicated that the concentrations of contaminants migrating towards the river are less on the downgradient side of the recovery trench than on the upgradient side by nearly two orders of magnitude [2, p. 18-19].

The surface water migrates downstream from the PPE in the West River for approximately 7 miles, entering New Haven Harbor at the mouth of West River (Figure 3). New Haven Harbor is coastal tidal water for 1.5 miles. The remainder of the surface water pathway is a 6.5-mile radial arc in Long Island Sound. The West River is tidally influenced from New Haven Harbor upstream to Route 34, approximately 1.2 miles downstream of the PPE. Between 1982 and 1987, the U.S. Geological Survey (USGS) measured stream gage heights on the West River on a sporadic schedule; the mean discharge calculated for West River was 42.67 cubic feet per second (cfs). Both New Haven Harbor and Long Island Sound are marine water bodies classified as coastal tidal water and ocean zone, respectively [2; 8; 9; 10; 13]. Table 6 summarizes the surface water bodies along the 15-mile downstream pathway.



# SURFACE WATER PATHWAY

EMHART ENTERPRISES  
NEW HAVEN, CONNECTICUT



REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #

99-05-0008

DRAWN BY:

C. VOSS

DATE

1/27/98

FILE NAME:

S:\97040031\FIG3

FIGURE 3



**Table 6****Surface Water Bodies Along the 15-Mile Downstream Pathway from Emhart Enterprises**

Surface Water Body	Descriptor <sup>a</sup>	Length of Reach (miles)	Flow Characteristics (cfs) <sup>b</sup>	Length of Wetland Frontage (miles)
West River	Small to Moderate Stream	7.0 miles	10 - 100 cfs	4.4 miles
New Haven Harbor	Coastal Tidal water	1.5 miles	NA	3 miles
Long Island Sound	Shallow to deep ocean zone	6.5 miles	NA	Undocumented

<sup>a</sup> Small to moderate stream 10-100 cfs. Coastal tidal waters (flow not applicable). Shallow ocean zone or Great Lake (flow not applicable).

<sup>b</sup> Cubic feet per second.  
[2; 8; 9; 10]

The CT DEP Western Fisheries Division stocks the West River with trout upstream of its confluence with Wintergreen Brook. According to CT DEP, people fish from the West River in the vicinity of the Emhart Enterprises facility. The West River is tidally influenced upstream into Edgewood Park. Additional fish species in the West River include longnose dace, white suckers, and other slow river species [2, p. 20].

The nearest section of wetland habitat, located approximately 0.2 miles downstream of the PPE and bordering the West River for approximately 0.3 miles, has been identified by the National Wetland Inventory (NWI) as scrub-shrub palustrine wetlands [2; 8; 9; 10]. Additional wetland habitats located on the West River, downstream of the PPE, include emergent estuarine wetlands, and open water riverine wetlands. Approximately 4.4 miles of emergent estuarine and palustrine wetland habitats border the West River between the PPE and New Haven Harbor. NWI has identified the majority of the western shore of New Haven Harbor as habitat for beach/bar and flat intertidal estuarine wetlands. Beach/bar wetland habitats are primarily cobble/gravel and sand and are not considered to be sensitive environments under the CERCLA. The flat estuarine wetland habitat ranges from cobble/gravel to vegetated non-pioneer. According to the Soil Survey of New Haven County, developed by the U.S. Department of Agriculture, the New Haven Harbor shoreline is bordered by gravel and sand beaches [2, p. 20; 8; 9; 10].

The water supply for the majority of the 185,000 people living within 4-radial miles of the property is Lake Gaillard, the primary drinking water supply for the entire City of New Haven. Lake Gaillard is located approximately 9 miles east of the Emhart Enterprises property [1; 5; 6]. No known surface water intakes exist along the 15-mile downstream pathway for public drinking water supplies [5]. The property is located in Flood Zone A1-A30, an area of 100-year flooding according to the Federal Emergency Management Agency (FEMA) [11]. Several threatened and endangered species occur along the 15-mile downstream pathway. These include six State-threatened species, one State-endangered species, and two Federally-endangered species [12].

Table 7 presents the sensitive environments, excluding wetlands, located along the 15-mile downstream pathway from the Emhart property.

**Table 7**

**Sensitive Environments Along the 15-Mile Downstream Pathway from  
Emhart Enterprises**

Sensitive Environment Name	Sensitive Environment Type	Water Body	Downstream Distance from PPE (miles)	Flow Rate at Environment (cfs) <sup>a</sup>
West River	Clean Water Act	West River	0	10 - 100 cfs
<i>Aristida tuberculosa</i>	State-threatened	Long Island Sound	< 15 miles	NA
<i>Casmerodius albus</i>	State-threatened	Long Island Sound	< 15 miles	NA
<i>Charadrius melodus</i>	Federal-threatened	Long Island Sound	< 15 miles	NA
<i>Egretta thula</i>	State-threatened	Long Island Sound	< 15 miles	NA
<i>Eremophila alpestris</i>	State-threatened	Long Island Sound	< 15 miles	NA
<i>Panicum amarum</i>	State-threatened	Long Island Sound	< 15 miles	NA
<i>Scutellaria leonardii</i>	State-endangered	Long Island Sound	< 15 miles	NA
<i>Sterna dougalli</i>	Federal-endangered	Long Island Sound	< 15 miles	NA
<i>Sterna antillarum</i>	State-threatened	Long Island Sound	< 15 miles	NA

<sup>a</sup> Cubic feet per second  
PPE = Probable Point of Entry  
NA = Not applicable  
[12]

On 15 October 1998, START collected nine sediment samples (including duplicates) from six locations along both the West River and Wintergreen Brook (Figure 2). The samples were analyzed for VOCs, SVOCs, Pest/PCBs, and inorganics (total metals and cyanide) by a predesignated DAS laboratory. Sediment samples SD-05 and SD-06 were collected to establish reference conditions for sediment samples collected from the West River (SD-04, SD-03, SD-02, and SD-01). Sediment samples SD-10 and SD-11 were collected to establish reference conditions for the sediment sample collected along Wintergreen Brook (SD-07). Table 8 summarizes the sediment samples collected during the sampling event.

Table 8

**Sample Summary: Emhart Enterprises  
Samples Collected by START on 15 October 1998**

Sample Location No.	Traffic Report No.	Time (hrs)	Remarks	Sample Depth (Inches)	Sample Source
<b>MATRIX: Sediment</b>					
SD-01	DAFS55	1034	Grab	0 to 6	Grab sediment sample collected approximately 475 feet downstream of the PPE, on northern bank of the West River, depth 0-6 inches. This sample was collected to document a release via groundwater to surface water discharge. Material was moist sediment; dark brown silt with a trace of coarse sand and gravel; FID reading = 0 units (background = 0 units); pH = 6; Temperature = 15 °C; Conductivity = 150 $\mu$ mhos.
SD-02	DAFS56	1040	Grab	0 to 6	Grab sediment sample collected approximately 275 feet downstream of the PPE, on the west side of the property in the West River, depth 0-6 inches. This sample was collected to document a release via groundwater to surface water discharge. Material was moist sediment; dark brown silt, with a trace of coarse sand and gravel; FID reading = 0 units (background = 0 units); pH = 6; Temperature = 15 °C; Conductivity = 80 $\mu$ mhos.
SD-03	DAFS57	1040	Grab	0 to 6	Duplicate of SD-02 collected for quality control.
SD-04	DAFS58	1055	Grab	0 to 6	Grab sediment sample collected at the PPE, on the west side of the property in the West River, depth 0-6 inches. This sample was collected to document a release via groundwater to surface water discharge. Material was moist sediment; dark brown silt, with a trace of coarse sand and gravel; FID reading = 0 units (background = 0 units); pH = 6; Temperature = 14 °C; Conductivity = 80 $\mu$ mhos.

Table 8

**Sample Summary: Emhart Enterprises**  
**Samples Collected by START on 15 October 1998**  
**(Continued)**

Sample Location No.	Traffic Report No.	Time (hrs)	Remarks	Sample Depth (Inches)	Sample Source
SD-05	DAFS59	1107	Grab	0 to 6	Grab sediment sample collected approximately 100 feet upstream of the PPE, northwest of the property in the West River, depth 0-6 inches. This sample is a reference sample for metals analysis. Material was moist sediment; dark brown silt, a trace of coarse sand and gravel; FID reading = 0 units (background = 0 units); pH = 6; Temperature = 14 °C; Conductivity = no reading.
SD-06 (MS/MSD)	DAFS60	1107	Grab	0 to 6	Grab sediment sample collected approximately 100 feet upstream of the PPE, northwest of the property in the West River, depth 0-6 inches. This sample is a reference sample. Material was moist sediment; dark brown silt, a trace of coarse sand and gravel; FID reading = 0 units (background = 0 units); pH = 6; Temperature = 14 °C; Conductivity = no reading.
SD-07	DAFS61	1245	Grab	0 to 6	Grab sediment sample collected downgradient of the confluence of Wintergreen Brook and Beaver Ponds Brook, on the southeast corner of the property, depth 0-6 inches. This sample was collected to document a release via groundwater to surface water discharge. Material was moist sediment; dark brown silt, a trace of coarse sand and gravel; FID reading = 0 units (background = 0 units); pH = 6; Temperature = 14 °C; Conductivity = 130 $\mu$ mhos.
SD-10	DAFS64	1300	Grab	0 to 6	Grab sediment sample collected upstream of Wintergreen Brook, on the northeast corner of the property, depth 0-6 inches. This sample is a reference sample. Material was moist sediment; dark brown silt, a trace of coarse sand and gravel; FID reading = 0 units (background = 0 units); pH = 6; Temperature = 13 °C; Conductivity = 130 $\mu$ mhos.

Table 8

**Sample Summary: Emhart Enterprises**  
**Samples Collected by START on 15 October 1998**  
**(Concluded)**

Sample Location No.	Traffic Report No.	Time (hrs)	Remarks	Sample Depth (Inches)	Sample Source
SD-11	DAFS65	1300	Grab	0 to 6	Grab sediment sample collected upstream of Wintergreen Brook, on the northeast corner of the property, depth 0-6 inches. This sample is a reference sample for metals analysis. Material was moist sediment; dark brown silt, a trace of coarse sand and gravel; FID reading = 0 units (background = 0 units); pH = 6; Temperature = 13 °C; Conductivity = 130 $\mu$ mhos.
<b>MATRIX: Aqueous</b>					
RB-01	DAFS66	1345	Grab	NA	Sampling equipment rinsate blank for quality control.
TB-01	DAFS67	1400	Grab	NA	Trip blank for quality control (DAS Laboratory).
<b>MATRIX: Performance Evaluation Samples</b>					
PE-0017445	DAFS68	NA	Grab	NA	Aqueous Performance Evaluation sample for VOCs.
PE-0010210	DAFS69	NA	Grab	NA	Aqueous Performance Evaluation sample for SVOCs.
PE-0008671	DAFS70	NA	Grab	NA	Performance Evaluation sample for pesticides/PCBs.
PE-TT02557	DAFS73	NA	Grab	NA	Solid Performance Evaluation sample for PCBs.
PE-ICC01090	DAFS71	NA	Grab	NA	Solid Performance Evaluation sample for metals.
PE-0016670	DAFS72	NA	Grab	NA	Aqueous Performance Evaluation sample for cyanide.

MS/MSD = Matrix Spike/Matrix Spike Duplicate  
 NA = Not applicable  
 FID = Flame Ionization Detector  
 VOCs = Volatile Organic Compounds  
 PPE = Probable Point of Entry  
 DAS = Delivery of Analytical Services

SVOCs = Semivolatile Organic Compounds  
 PCB = Polychlorinated biphenyl  
 ° C = Degrees Celsius  
 $\mu$ mhos = Micromhos  
 hrs = Hours

Organic analyses of the sediment samples indicated that two SVOCs (anthracene and fluorene) and two pesticide/PCBs (endosulfan II and 4,4'-DDD) were detected at concentrations greater than or equal to the reference sample's sample quantitation limit (SQL) or at least three times the reference sample. Anthracene and fluorene were detected in SD-03 at 540 ppb and 300 J ppb respectively and were detected in the reference sample (SD-06) at 140 J ppb and 56 J ppb respectively. Endosulfan II and 4,4'-DDD were detected in SD-07 at 9.1 J ppb and 12 J ppb, respectively, and were detected in the reference sample (SD-10) at 3.7 U ppb and 3.5 J ppb, respectively. No VOCs, metals, or cyanide were detected in sediment samples. Table 9 is a summary of the organic compounds detected through DAS analyses of the START sediment samples [18; 19].

During data validation VOC and SVOC sample results were qualified as a result of measurement error, which includes both analytical (laboratory) error and sampling (field) error. Measurement error associated with sample analysis includes calibration variability. There were no major impacts on data usability. Pest/PCB sample results were qualified as the result of measurement error, which includes both analytical error and sampling error. Measurement error associated with sample analysis includes calibration variability, poor dual column correlation, and failed target compound identification criteria. Several Pest/PCB compounds were either rejected or were qualified as undetected. Metal and cyanide sample results were qualified due to measurement error, which includes both analytical and sampling error. Measurement error associated with sample analysis includes calibration variability, laboratory blank contamination, poor matrix spike recovery, and poor laboratory control sample recoveries. There were no major impacts on data usability [18; 19].

**Table 9**

**Summary of START Analytical Results  
Sediment Sample Analysis for Emhart Enterprises**

Sample Location	Compound	Sample Concentration	Reference Concentration	Comments
SD-03 DAFS60	<b>SVOCs</b>			
	Anthracene †	540 µg/kg	140 J µg/kg	3.86 × Ref.
	Fluorene †	300 J µg/kg	56 J µg/kg	5.36 × Ref.
SD-07 DAFS61	<b>Pesticides/PCBs</b>			
	Endosulfan II ‡	9.1 J µg/kg	3.7 U µg/kg	2.46 × SQL
	4,4'-DDD ‡	12 J µg/kg	3.5 J µg/kg	3.43 × Ref.

† SD-07 is the reference sample.

‡ SD-10 is the reference sample.

SQL = Sample Quantitation Limit.

Ref. = Reference value.

µg/kg = Micrograms per kilogram.

SVOCs = Semivolatile organic compounds.

J = Quantitation is approximate due to limitations identified during the quality control review.

U = Indicates the sample was analyzed for, but not detected, and reports the detection value.

PCBs = Polychlorinated biphenyls

Although substances detected along the surface water pathway are elevated in relation to their respective reference samples, there has been no documentation of their historical use on the Emhart property. The release of hazardous substances to the surface water pathway can not be attributed to the Emhart property. Complete analytical results of START sediment samples including quantitation and detection limits are presented in Attachment A of this report.

Sediment samples have been collected along the surface water pathway by START personnel during the Emhart SI; however, a release to the surface water pathway can not be attributed to the Emhart property. Based on available data, no historical release of hazardous substances to the surface water pathway has been documented, and no sensitive environments or potential contaminant targets are known or suspected to have been impacted.

## **SOIL EXPOSURE PATHWAY**

The New Haven Manufacturing Corporation currently employs 155 workers. Access to the Emhart property is limited from the west, south, and east by the West River and Wintergreen Brook [7]. The property is located in an area zoned for industrial facilities. Properties located to the north and northeast of the Emhart property are zoned for residential use [2]. The nearest residence is approximately 100 feet east of the Emhart property [7]. A playground area is located approximately 200 feet northwest of the property [7]. An estimated 19,815 people live within 1-radial mile of the property [6; 13; 14; 15].

The majority of the Emhart property is paved [7]. Analytical results of soil boring samples collected as part of well installation by Cascio personnel indicate that VOCs are present at 0 to 2 ft bgs. While soil borings were drilled in the paved area, it is possible that similar contaminants are present in exposed grass-covered areas. The hazardous substances released to the ground and documented as having contaminated the groundwater are chlorinated VOCs. These VOCs are no longer used on the property [2, p. 20].

During the installation of the groundwater monitoring wells in October 1989, soil samples were collected by Cascio personnel at various depths: 5 to 7 ft, 10 to 12 ft, and 15 to 17 ft bgs; one composite sample was collected from the three intervals by taking one-third of each of the interval samples. This composite sample was analyzed for the presence of halogenated, aromatic, and volatile compounds to determine if contamination was present at the location. The interval samples were stored and were analyzed only if contamination was detected in the corresponding composite sample collected to determine at what depth the contamination was located. Based on available file information, contamination is assumed by START to have been detected in the composite samples collected from MW-3 and MW-4; however, analytical results could not be located in available file information [16]. Comments

The interval soil samples collected from MW-3 and MW-4 in October 1989 were analyzed on 10 January 1990 (approximately 80 days after collection). Results of the soil samples from monitoring wells MW-3 and MW-4 showed no detectable levels of contamination at any of the depths for which samples were collected. However, these results are considered suspect since the contamination is volatile in nature and may have evaporated during the time the samples were held [16].



A second round of monitoring wells were installed at New Haven Manufacturing Corporation on 8 March 1990 by Connecticut Test Borings and Cascio. Two wells were installed and labeled MW-12 and MW-13. Monitoring well MW-12 was placed as close as possible to the former location of the 1,1,1-TCA AST. Monitoring well MW-13 was placed in the paved area near MW-11 and MW-4 to supplement the data from these wells. Soil samples were collected by Cascio during the installation of each well. Samples were collected immediately beneath the pavement and at 5, 10, and 15 feet depths [16].

The samples collected from MW-12 were discretely tested for the presence of halogenated volatile organics by using EPA Method 8010. Samples from MW-13 were composited prior to being analyzed with the same method. The soil samples, collected at a depth of 0 to 2 feet, from monitoring well MW-12 contained 1,1,1-TCA ( $6.6 \mu\text{g/kg}$ ) and trichloroethylene ( $2.3 \mu\text{g/kg}$ ) [16]. No known reference sample was collected during the sampling event.

START did not perform surface soil sampling as part of the Emhart property SI. Based on analytical results from previous surface soil sampling, soils on the property have been impacted by a release of hazardous substances which appears attributable to on-site sources. However, due to access restrictions and the distance to the nearest residence, no known impacts to nearby residences or sensitive environments are known or suspected.

## AIR PATHWAY

An estimated 184,854 people reside within 4-radial miles of the Emhart property, and 155 workers are employed on the property [6; 7]. During the on-site reconnaissance conducted on the property, a playground was observed approximately 200 feet northwest of the property [7]. Table 10 summarizes the estimated population within 4-radial miles of the property.

**Table 10**  
**Estimated Population Within 4-Radial Miles of**  
**Emhart Enterprises**

Radial Distance from Emhart Enterprises (miles)	Estimated Population
0.00 < 0.25	1,165
0.25 < 0.50	3,806
0.50 < 1.00	14,854
1.00 < 2.00	57,780
2.00 < 3.00	54,341
3.00 < 4.00	52,908
TOTAL	184,854

[6; 13; 14; 15]

There are wetlands and several threatened/endangered species habitats located within 4-radial miles of the property [8; 9; 10; 12]. Table 11 summarizes the sensitive environments located within 4-radial miles of the Emhart Enterprises property.

**Table 11**

**Sensitive Environments Located Within 4-Radial Miles of Emhart Enterprises**

Radial Distance from Emhart Enterprises (miles)	Sensitive Environment/Species (status)
0.00 < 0.25	CWA (Clean Water Act).
	1.5 Acres of Wetlands
0.25 < 0.50	1 State-endangered species
0.50 < 1.00	7 Acres of Wetlands
	4 State-endangered species
1.00 < 2.00	60 Acres of Wetlands
	2 State-endangered species
	2 State-threatened species
2.00 < 3.00	99 Acres of Wetlands
	1 State-threatened species
	5 State-endangered species
3.00 < 4.00	161 Acres of Wetlands
	2 State-endangered species

[12; 13; 14; 15]

No laboratory qualitative air samples are known to have been collected from Emhart Enterprises. Based on the available data, no release of hazardous substances to the ambient air from on-site sources is known or suspected to have occurred, and no impacts to nearby residential populations or sensitive environments are known or suspected.

## SUMMARY

The Emhart Enterprises (Emhart) property is located at 446 Blake Street in the City of New Haven, New Haven County, Connecticut. The geographic coordinates of the property are 41° 19' 37.6" north latitude and 72° 57' 28.7" west longitude. Emhart is located in a highly developed urban area with commercial and multi-residential properties surrounding the facility on all sides.

The Emhart property consists of an irregularly shaped 10.2-acre parcel of land identified by the City of New Haven Tax Assessor's office on Map No.372, Block No. 1159, Parcel 00. Emhart occupies two properties separated by Wintergreen Brook [2; 7]. The western property (active property) is approximately 8.58 acres, and has been occupied by manufacturing facilities since the 1890s. Starting in 1963, MITE (Miniature Industrial Technological Equipment) Corporation operated at this property. The manufacturing building is currently owned by the New Haven Manufacturing Corporation. New Haven Manufacturing currently has four divisions: Amaton, Stromberg, Gar Kenyon, and Piat Incorporated, which manufacture electronic timing devices, hydraulic valves, and electronic assembly hardware components.

On 24 November 1997, Roy F. Weston, Inc. (WESTON®), Superfund Technical Assessment and Response Team (START) conducted an on-site reconnaissance of the Emhart property. The manufacturing building is approximately 118,000 square feet (ft<sup>2</sup>) and is constructed on a concrete slab. The exterior of the facility building is located approximately 40 feet from Wintergreen Brook on the southeast corner of the property and 15 feet from West River. The inactive parcel of the property, located on the east side of Wintergreen Brook, consists of a vacant lawn mower repair shop.

Runoff over the property flows from the northern side of the facility, around the building, into the West River and Wintergreen Brook. The flood control project completed by U. S. Army Corps of Engineers (ACOE) channels most of the runoff from the property into one discharge point, at the confluence of the two surface water bodies. The most upstream probable point of entry (PPE) of overland runoff from the property is the point at which runoff from the northwestern corner of the property enters the West River. The flood control measures on both sides of the brook have made the brook inaccessible to the public for recreation or fishing in the immediate area of the manufacturing facility. Additionally, the south side of the Emhart property is lined by a chain-link fence and barbed wire.

The surface water migrates downstream from the PPE in the West River for approximately 7 miles, entering New Haven Harbor at the mouth of West River. The nearest section of wetland habitat, located approximately 0.2 miles downstream of the PPE, borders the West River for approximately 0.3 miles, has been identified by the National Wetland Inventory (NWI) as scrub-shrub palustrine wetlands.

The water supply for the majority of the 185,000 people living within 4-radial miles of the property is Lake Gaillard, the primary drinking water supply for the entire City of New Haven. Lake Gaillard is located approximately 9 miles east of the Emhart property. There are no surface water intakes along the 15-mile downstream pathway for public drinking water supplies.

The property is located in Flood Zone A1-A30, an area of 100-year flooding according to the Federal Emergency Management Agency. Several threatened and endangered species occur along the 15-mile downstream pathway. These include six State-threatened species, one State-endangered species, and two Federally-endangered species.

The New Haven Manufacturing Corporation currently employs 155 workers. Access to the property is limited from the west, south, and east by the West River and Wintergreen Brook. The property is located in an area zoned for industrial facilities. Properties located to the north and northeast of the Emhart property are zoned for residential use. The nearest residence is approximately 100 feet east of the Emhart property. There is a playground area approximately 200 feet northwest of the property. An estimated 19,815 people live within 1-radial mile of the property.

Representatives of New Haven Manufacturing, current owners of Emhart, allege that the area of soil in the southwest corner of the property was contaminated by chlorinated volatile organic compounds (VOCs), specifically 1,1,1-trichloroethane (TCA), as a result of overflow from a 500-gallon solvent storage tank. Before New Haven Manufacturing changed its solvent to methylene chloride, this tank contained TCA and was located 10 feet to the southwest of its current location over unpaved ground. These spills occurred in the 1960s, prior to construction of a containment dike around the tank.

In June 1982, the Connecticut Department of Environmental Protection (CT DEP) responded to calls that reported 55-gallon drums floating in the West River and washed up along the banks of the West River after a storm. These drums were swept downstream from several upstream industries. A total of 59 drums were located by CT DEP personnel. MITE Corporation estimated losing 50 to 60 drums during the storm.

In 1990, under contract to New Haven Manufacturing, Cascio Bechir Engineers (Cascio) completed a report entitled *Soil and Groundwater Testing and Remediation Plan*. Cascio completed a subsurface exploratory program to investigate the possibility of environmental contamination to the site as a result of the historic use of the site as a manufacturing facility. Soil and water samples were collected and analyzed for VOCs and heavy metal contaminants. Results indicated the presence of VOCs in groundwater in nine wells on site, and soil contamination in the vicinity of a former solvent storage tank.

To date no known quantitative air samples have been collected from the Emhart property. Approximately 1,165 people live within 0.25-radial miles of the Emhart property and approximately 184,854 people live within 4-radial miles of the property. Sensitive environments located within 4-radial mile of the property include wetlands, Clean Water Act water bodies, and State-endangered and threatened species. No release of hazardous substances to the ambient air from on-site sources is known or suspected to have occurred.

Based on past sampling events conducted on the property, there has been a confirmed release to groundwater and soil on the property. Surface water pathway sampling has been conducted on the property by START, and no release of hazardous substances attributable to historic operations conducted on the property was established. Groundwater treatment on the property was initiated and ceased when contaminant levels were below State of Connecticut groundwater standards. To date, no known action have been conducted to address the low levels of soil contamination remaining on the property.

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